IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPEAL BRIEF- 37 C.F.R. § 1.192

U.S. Patent Application 09/649,608 entitled,

"METHOD AND SYSTEM FOR THE RECOGNITION OF READING, SKIMMING, AND SCANNING FROM EYE-GAZE PATTERNS"

Real Party in Interest: International Business Machines Corporation

Related Appeals and Interferences:

None

Status of Claims:

Claims 1-25 are pending.

Claim 26 is withdrawn from consideration.

Claims 1-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over

Tognazzini et al. (5,886,683) in view of Jones (GB 2,170,910).

Status of Amendments:

Amendment "After Final", filed 6/19/2003, not entered.

Summary of the Invention:

The present invention provides for a system and method for recognizing, from eye-gaze patterns, when the user is reading, skimming, or scanning on a display filled with heterogeneous content. Heterogeneous content includes objects normally encountered on computer monitors, such as text, images, hyperlinks, windows, icons, and menus. In one embodiment, the system uses information about what text the user is reading or skimming to infer user interest and uses this information to adapt to the user's needs. The adaptation process includes recording the text of interest in a user model and using the text to find related information from local machine databases, local area network databases, or wide area network databases such as the World Wide Web.

The present invention's method for recognizing, from eye-gaze patterns, when a user is reading, skimming, or scanning, comprises at least the steps of: (1) quantized representation of eye-movements of a user viewing heterogeneous content (e.g. text, images, hyperlinks, windows, icons, menus, etc.), (2) accumulated evidence based detection, and (3) mode switching. First, the eye-movements in both x and y positions are quantized (e.g., averaged), in one embodiment over 100 ms intervals. This process removes some of the inaccuracy of prior art eye-tracking hardware and reduces the influence of micro-saccades. Second, evidence of reading is

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accumulated until it crosses a threshold value. The system may increment a reading-evidence variable by 1, for instance, when the eye moves to the right and de-incrementing by 1, for instance, when the eye moves to the left. If the reading-evidence reaches a threshold, then "reading" is detected and the mode switched from scanning to reading. If the threshold is not reached, then the system continues to collect evidence of reading.

Pending Claims (all citations are made from the original specification, including the figures):

1. A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns (Title, Abstract, Summary of invention, page 7, lines 12-13, etc.), said method comprising the steps of:

quantizing eye movements of a user (figure 6, element 602) viewing heterogeneous content (page 9, line 11) in both X and Y axes(page 9, line 15); accumulating a numerical evidence of reading (figure 6, element 604) until a predetermined threshold is reached (figure 6, element 605); and

detecting reading when said numerical evidence of reading exceeds said threshold (figure 6, element 610).

2. A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 1, wherein said quantizing step includes averaging over a predetermined period of time (page 9, line 15).

3. A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 1, wherein said heterogeneous content includes at least one of the following: text, images, hyperlinks, windows, icons, and menus (Summary of Invention, page 7, lines 14,15).

4. A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 1, comprising the further step of switching modes from a skimming mode and a scanning mode to a reading mode when said reading is detected (figures 5-7, elements

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506, 612, 710, respectively).

5.   A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 4, comprising the further step of adapting to said user's need if said reading is detected (figure 9, 906).

6.   A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 5, wherein said adapting step comprises the further steps of:

recording said heterogeneous content that is of interest to said user (figure 10, 1002);

finding relevant information from a database (figure 10, 1004) using said recorded heterogeneous content; and utilizing said found relevant information to adapt to a user's needs(figure 10, 1006).

7.   A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 6, wherein said utilizing step comprises the further step of developing accurate models of said users (figure 8, 804).

8.   A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 6, wherein said utilizing step comprises the further step of determining fine-grained information regarding said user's interest in Internet advertising (figure 8, 806).

9.   A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 6, wherein said utilizing step comprises the further step of providing more accurate help regarding computer applications (figure 8, 808).

10.   A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 6, wherein said database includes at least one of the following: a local machine database (figure 11, 1102), a local area network database (figure 11, 1104), and a wide area network database (figure 11, 1106).

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11.   A method for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 10, wherein said wide area network database is the world wide web (page

13, line 19).

12.   A system for recognizing reading, skimming, and scanning modes from eye-gaze patterns

(figure 7, page 10, starting on line 16), said system comprising:

an eye-movement quantizer (figure 7, 702)that quantizes eye movements of a user

viewing heterogeneous content in both X and Y axes;

a reading-evidence accumulator (figure 7, 704) that accumulates a numerical evidence of

reading;

a threshold-comparator (figure 7, 706)that compares said numerical evidence of reading

against a predetermined threshold; and

a reading-detector (figure 7, 708)that detects reading when said numerical evidence of

reading exceeds said predetermined threshold.

13.   A system for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 12, wherein said eye-movement quantizer averages over a predetermined

period of time (page 9, line 15).

14.   A system for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 12, wherein said heterogeneous content includes at least one of the

following: text, images, hyperlinks, windows, icons, and menus (Summary of Invention, page

7, lines 14,15).

15.   A system for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 12, further comprising a mode-switcher (figure 7, 710) that switches

modes from a skimming mode and a scanning mode to a reading mode when said reading is

detected.

16.   A system for recognizing reading, skimming, and scanning modes from eye-gaze

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patterns, as per claim 15, wherein said mode-switcher generates a user adaptation command signal when switching to said reading mode (figure 9, 906).

17.   A system for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 16, wherein, in response to said user adaptation command signal:

records said heterogeneous content that is of interest to said user (figure 10, 1002);

finds relevant information from a database (figure 10, 1004) using said recorded heterogeneous content; and utilizes said found relevant information to adapt to a user's needs(figure 10, 1006).

18.   A system for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 17, wherein the system develops accurate models of said users (figure 8, 804).

19.   A system for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 17, wherein the system determines fine-grained information regarding said user's interest in Internet advertising (figure 8, 806).

20.   A system for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 17, wherein the system provides more accurate help regarding computer applications (figure 8, 808).

21.   A system for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 17, wherein said database includes at least one of the following: a local machine database(figure 11, 1102), a local area network database (figure 11, 1104), and a wide area network database (figure 11, 1106).

22.   A system for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 21, wherein said wide area network database is the world wide web (page 13, line 19).

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23.   A system for recognizing reading, skimming, and scanning modes from eye-gaze patterns (figure 7, page 10, starting on line 16), said system comprising:

means for quantizing eye movements (figure 7, 702) of a user viewing heterogeneous content in both X and Y axes;

means for accumulating a numerical evidence of reading (figure 7, 704);

means for comparing said numerical evidence of reading against a predetermined threshold (figure 7, 706); and

means for detecting reading when said numerical evidence of reading exceeds said predetermined threshold (figure 7, 708).

24.   An article of manufacture comprising a computer program product having a machine-readable medium including computer program instructions embodied therein for recognizing reading, skimming, and scanning from eye-gaze patterns (figure 7, page 10, starting on line 16) with:

computer program instructions for quantizing eye movements of a user viewing heterogeneous content in both X and Y axes (figure 7, 702), said quantizing based on averaging over a predetermined period of time (page 9, line 15);

computer program instructions for accumulating a numerical evidence of reading until a predetermined threshold is reached (figure 7, 704);

computer program instructions for detecting reading when said numerical evidence of reading exceeds said predetermined threshold (figure 7, 706); and

computer program instructions for switching modes from a scanning mode and a skimming mode to a reading mode when reading is detected (figure 7, 710).

25.   An article of manufacture comprising a computer program product having a machine-readable medium including computer program instructions embodied therein for utilizing user interest information to adapt a computer to a user's needs (figure 9, 900) with:

computer program instructions for recording eye-gaze patterns of said user viewing heterogeneous content (figure 9, 902);

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computer program instructions for determining from said recorded patterns whether said user is reading, skimming, and scanning (figure 9, 904);

computer program instructions for recording heterogeneous content of interest to said user upon detection of said reading (figure 10, 1002);

computer program instructions for finding relevant information from a database using said recorded heterogeneous content of interest (figure 10, 1004); and

computer program instructions for adapting said computer to said user's needs using said relevant information (figure 10, 1006).

Issues:

I. Was the interview "After Final" process conducted in good faith and according to proper USPTO procedures?

II. Were the reasons for non-entry of the amendment "After Final" proper?

III. Does the combination of references (Tognazzini et al. (5,886,683) in view of Jones (GB 2,170,910)) provide for the elements of the claims of the present invention?

IV. Has the examiner established a *prima facia* case of obviousness for the outstanding rejection of claims 1-25 under 35 U.S.C. § 103(a) as being unpatentable over Tognazzini et al. (5,886,683) in view of Jones (GB 2,170,910)?

Grouping of Claims:

All claims stand or fall together.

Argument

I. An "Interview after Final" was granted and conducted on 7/17/2003, with follow-up interviews on 7/17/03 and 8/7/03. The interviews were initially with examiner Chanh Nguyen and applicant's representatives Randy Lacasse and Ramraj Soundararajan. The interview of 8/7/03 was with Randy Lacasse and the examiner's supervisor Steven Saras. During the first interview, the examiner agreed that the applied references were different

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than the claimed invention. However, he felt that some additional language would assist in more clearly defining this relationship. The language was chosen, upon mutual agreement, from the argument put forth in applicant's first amendment. Specifically, the language was chosen from the entered amendment of record of 2/7/03, page 4, lines 1-5 and page 6, lines 7-13. The examiner was very helpful in determining this language, and indicated that the claims as amended by this language would fully overcome the rejections under Tognazzini and Jones (see examiner's interview summary dated 6/17/03). Applicants' representative accordingly submitted such as an amendment "After Final" (as fully discussed in the interview).

II. The examiner then submitted an "Advisory action" indicating that the amendment presented new issues not earlier presented and would require a new search.

    a. Applicants' representatives were surprised by the examiner's change in position from the interview and contacted him to discuss. His answer was contrary to traditional USPTO practice. He indicated that he had conducted the interview "After Final" only to develop claim language which would be allowable upon the filing of an RCE. At no time during the interview had the examiner discussed filing an RCE to advance the prosecution of the case. We acted in accordance with his specific guidance to make the amendments as discussed and feel that he acted in bad faith by holding the allowance in abeyance in exchange for applicant's filing of an RCE.

    b. In a subsequent interview with the examiner's SPE, these facts were discussed and it was indicated to us (by the SPE) that the examiner should not have requested for us to file an RCE. However, the SPE reaffirmed that the amendment "After Final" would not be entered because it raised new issues which required an additional search.

The applicant's position, with respect to the non-entry of the amendment after final is:

1. Acknowledgment that neither the interview nor subsequent amendment are by matter of right, but rather by examiner discretion. We appreciated the opportunity to interview and submit the amendment "After Final".

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2. However, the examiner appears to have acted in bad faith by agreeing to specific

   claim language to overcome the references of record and then requiring an RCE as

   passageway for entry.

3. The examiner cited that the amendment after final language raised new issues, yet this

   language was presented during an earlier amendment (arguments) and thus was of

   record and known to the examiner during prosecution. Also, the language was part of

   the original specification (page 9, lines 18+).

REJECTIONS UNDER 35 U.S.C. § 103(a)

The Examiner has rejected claims 1-25 under U.S.C § 103(a) as being unpatentable over

Tognazzini in view of Jones. With respect to these claims (claims 1-25), applicants respectfully

disagree with the Examiner as they contend that the presently claimed invention cannot be

obvious in view of any of the references because, even if there were a suggestion to combine

them, a combination of these references would not result in the presently claimed invention.

The U.S. patent to Tognazzini et al. (hereon Tognazzini) appears to disclose an effort to

capitalize on eye-gaze as a measure of user interest. Tognazzini describes a method and

apparatus for providing relevant information based on eye-gaze. For example, interest in some

display object is determined based on a fixation. If the user looks at an object on the screen long

enough, the system infers that the user is interested in that object. This same rule also applies to

blocks of text. Throughout Tognazzini, all formulations are based on this time of gaze aspect

(fixation). This differs greatly from the presently claimed invention as will be shown hereafter in

more detail.

With respect to claims 1, 12, 23, 24, and 25, the examiner states that Tognazzini discloses

a method of recognizing reading, skimming, and scanning modes from eye gaze patterns (in col.

4, lines 50-54). The first examiner citation appears to be in error as column 4, lines 50-54,

simply discus well known traditional newspaper layouts that use a technique of moving parts of

articles to different pages to enable quick reading. This does not describe a "method for

recognizing reading, skimming, and scanning modes from eye gaze patterns (claim 1), or a

"system" to perform this function (claims 12 and 23), or an article of manufacture comprising a

computer program product (claims 24 and 25). There is no basis for the examiner's assertion

with respect to the column 4 reading.

The examiner further states that Tognazzini discloses a method of recognizing reading, skimming, and scanning modes from eye gaze patterns (in col. 17, lines 1-5). A closer reading of Tognazzini, however, indicates that the disclosed method determines whether the user skimmed the information or read the information by "measuring the amount of time spent with each article and advertisement" (see column 17, lines 1-5 of the Tognazzini reference). First, Tognazzini does not recognize (or suggest) a scanning mode. Second, Tognazzini detects regions of interest (not actual reading) by determining the time spent gazing at a particular region of the computer screen (figure 4, figure 13, elements 1305, 1311).

The examiner asserts that Tognazzini fails to mention the limitation of "accumulating a numerical evidence of reading until a predetermined threshold is reached; and detecting reading when the numerical evidence of reading exceeds the threshold." These are very important features of the claims. Features the examiner has admitted that the main reference does not provide or suggest. The suggestion, teaching, or motivation to combine a secondary reference with this main reference to overcome the lack of claimed elements must come from within the references themselves, not from a reconstruction of the invention based on applicant's own teachings. It is applicant's position that nothing within the references would lead one to make this combination, nor would the combination provide for the claimed invention (even if properly combined).

The Foreign patent (GB 2170910) to Jones has been used by the examiner to support a finding of obviousness based on a combination with the main reference Tognazzini. Jones appears to provide for an eye tracking system with a control signal that is responsive to the 'direction of look' of a person's eye. Eye movement is detected by constantly measuring the rate of change of potential difference between the electrodes and comparing it against a threshold rate of $2°$ per second. However, the "reading" limitations of the claims are not met, nor suggested and thus Jones cannot provide for the claimed features.

A close reading of the Jones reference clearly shows that signal rate of change is compared against a threshold value of eye movement measured in degrees/sec (see page 2, lines 48-52 and lines 61-65 of the Jones reference) and not against an accumulated numerical threshold value of reading (as required by claims 1, 12, 23, 24, and 25). The examiner has

simply identified the term "threshold" absent a corresponding function and use. Terminology cannot be used in a vacuum simply because it is similar. First, Jones does not provide "any" teaching of "accumulating a numerical evidence". Jones only recognizes discrete instances when a threshold is crossed. In fact, until an eye movement threshold is crossed "no output" (26) is provided (page 2, line 64). Thus, *Jones explicitly cites that they are not accumulating numerical evidence before the threshold is crossed* and therefore cannot provide for the claimed feature. Second, Jones does not discuss any "reading" function tied to this threshold (only eye movement), and thus it is not seen how Jones can provide for accumulated numerical evidence of a parameter it is not monitoring. Jones is simply describing a mathematical way of measuring eye movement, and thus one cannot attribute claimed features (such as recognizing reading, skimming, and scanning) not discussed by Jones.

Applicants thus contend that the combination of Tognazzini and Jones does not make the claimed invention obvious. The above-mentioned arguments equally apply to all independent claims (1, 12, 23, 24, and 25).

One specific example of the claimed invention (as outlined in page 9, line 10 to page 10, line 1 of the application as filed) provides for a reading-evidence variable that can be incremented by 1 when the eye moves to the right and decremented by -1 when the eye moves towards the left. The reading evidence is then compared against a predetermined threshold (say 3) before reading is detected. This is in stark contrast with the method of Tognazzini wherein a region of interest is detected (not actual reading) based upon the amount of time spent gazing at that particular region in a computer screen.

As to independent claim 24, the examiner has mischaracterized the claim. The examiner cites on page 4, lines 8-11, that "claims 24 and 25, only differs from claim 12 and 23 in that the term "computer program instructions" is used in the claims..." However, a closer reading of claim 24 shows that it includes features "averaging over a predetermined period of time" (lines 5 and 6), and "switching modes from a scanning mode and a skimming mode to a reading mode when reading is detected" (lines 11 and 12). Absent a rejection of these elements, the examiner has failed to establish a *prima facia* case of obviousness as is required. Thus, the rejection of this claim is incomplete and without merit.

Regarding dependent claims 4-5, Tognazzini fails to provide for a threshold-based

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reading detection method that includes a step for switching between a scanning/skimming mode to a reading mode (when reading is detected upon reaching the threshold). As mentioned above, the Jones reference clearly shows that signal rate of change is compared against a threshold value of eye movement and not against a numerical threshold value of reading. Thus, no switching function is implied or suggested by the combination of Tognazzini and Jones.

With regard to dependent claims 6 and 10-11, applicants contend that Tognazzini provides for a method for monitoring eye gaze patterns to determine a level of interest. Thus, the method of Tognazzini measures the time period and location (within the screen) of an eye gaze. Thus, if a user stares at a particular area of a computer screen (see column 10, lines 5-10 of Tognazzini), the method of Tognazzini identifies the article corresponding to that particular area and articles related to the identified articles are provided to the user. By sharp contrast, the present invention's method detects reading (as opposed to gazing or staring) via a threshold and in the instance that reading is detected, the present invention extracts the text (see "recording said heterogeneous content" aspect of claim 1) that was read and retrieves additional information (retrieved from a database over a network).

Regarding independent claim 7 and 8, applicants contend that method of Tognazzini fails to provide for an accurate model of users as provided by the claimed invention. The method of Tognazzini identifies what applications on a computer screen (or areas on a computer screen) are getting the user's attention and any such identified applications or areas are then used to fine tune additional information (e.g., advertisements) provided. On the other hand, the present invention's method first detects what information was read by a user (based upon a threshold), and upon detection of reading, the present invention's method extracts the read text and fine tunes accurate models and advertisements based upon the read text that was extracted.

As to claim 9, applicants refer the Examiner to section D of page 12 of the application as filed. This specifically outlines the use of the method of the present invention to provide for accurate help in computer applications. For example, by analyzing read text, a system can provide accurate help based upon the read text (see context-sensitive help of section D of page 12 of the application as filed). Tognazzini fails to disclose or suggest the accurate help feature of the present invention.
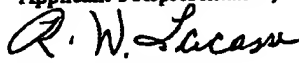
The above-mentioned arguments for dependent claims 2-11 equally apply to dependent claims sets 14-22.

Summary:

As has been detailed above, none of the references, cited or applied, provide for the specific claimed details of applicant's presently claimed invention, nor render them obvious. It is believed that this case is in condition for allowance and reconsideration thereof and early issuance is respectfully requested.

As this Appeal Brief has been timely filed within the set period of response, no petition for extension of time or associated fee is required. However, the Commissioner is hereby authorized to charge any deficiencies in the fees provided, to include an extension of time, to Deposit Account No. 09-0441.

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Appendix:

1.   A method for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, said method comprising the steps of:

        quantizing eye movements of a user viewing heterogeneous content in both X and Y

axes; accumulating a numerical evidence of reading until a predetermined threshold is reached;

and

        detecting reading when said numerical evidence of reading exceeds said threshold.

2.   A method for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 1, wherein said quantizing step includes averaging over a predetermined

period of time.

3.   A method for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 1, wherein said heterogeneous content includes at least one of the

following: text, images, hyperlinks, windows, icons, and menus.

4.   A method for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 1, comprising the further step of switching modes from a skimming mode

and a scanning mode to a reading mode when said reading is detected.

5.   A method for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 4, comprising the further step of adapting to said user's need if said reading

is detected.

6.   A method for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 5, wherein said adapting step comprises the further steps of:

        recording said heterogeneous content that is of interest to said user;

        finding relevant information from a database using said recorded heterogeneous content;

and utilizing said found relevant information to adapt to a user's needs.

7. A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 6, wherein said utilizing step comprises the further step of developing accurate models of said users.

8. A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 6, wherein said utilizing step comprises the further step of determining fine- grained information regarding said user's interest in Internet advertising.

9. A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 6, wherein said utilizing step comprises the further step of providing more accurate help regarding computer applications.

10. A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 6, wherein said database includes at least one of the following: a local machine database, a local area network database, and a wide area network database.

11. A method for recognizing reading, skimming, and scanning modes from eye-gaze patterns, as per claim 10, wherein said wide area network database is the world wide web.

12. A system for recognizing reading, skimming, and scanning modes from eye-gaze patterns, said system comprising:

an eye-movement quantizer that quantizes eye movements of a user viewing heterogeneous content in both X and Y axes;

a reading-evidence accumulator that accumulates a numerical evidence of reading;

a threshold-comparator that compares said numerical evidence of reading against a predetermined threshold; and

a reading-detector that detects reading when said numerical evidence of reading exceeds said predetermined threshold.

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13.   A system for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 12, wherein said eye-movement quantizer averages over a predetermined

period of time.

14.   A system for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 12, wherein said heterogeneous content includes at least one of the

following: text, images, hyperlinks, windows, icons, and menus.

15.   A system for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 12, further comprising a mode-switcher that switches modes from a

skimming mode and a scanning mode to a reading mode when said reading is detected.

16.   A system for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 15, wherein said mode-switcher generates a user adaptation command

signal when switching to said reading mode.

17.   A system for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 16, wherein, in response to said user adaptation command signal:

        records said heterogeneous content that is of interest to said user;

        finds relevant information from a database using said recorded heterogeneous content;

and utilizes said found relevant information to adapt to a user's needs.

18.   A system for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 17, wherein the system develops accurate models of said users.

19.   A system for recognizing reading, skimming, and scanning modes from eye-gaze

patterns, as per claim 17, wherein the system determines fine-grained information regarding said

user's interest in Internet advertising.

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computer program instructions for detecting reading when said numerical evidence of reading exceeds said predetermined threshold; and

computer program instructions for switching modes from a scanning mode and a skimming mode to a reading mode when reading is detected.

25. An article of manufacture comprising a computer program product having a machine-readable medium including computer program instructions embodied therein for utilizing user interest information to adapt a computer to a user's needs with:

computer program instructions for recording eye-gaze patterns of said user viewing heterogeneous content;

computer program instructions for determining from said recorded patterns whether said user is reading, skimming, and scanning;

computer program instructions for recording heterogeneous content of interest to said user upon detection of said reading;

computer program instructions for finding relevant information from a database using said recorded heterogeneous content of interest; and

computer program instructions for adapting said computer to said user's needs using said relevant information.